UNITED STATES PATENT AND TRADEMARK OFFICE

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10/805,596	03/19/2004	Daniel L. W. Chieng	D2A1230-1	1464

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EXAMINER
YAARY, MICHAEL D

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>09 October 2008</u>.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1,2,5-12,15,16 and 19-26</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1,2,5-12,15,16 and 19-26</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

1.   Claims 1, 2, 5-16, and 19-26 are pending in the application.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 1-4, 7, 10-14, 19, 22, and 23 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Ooyabu (US Pat. 5,319,584) in view of Adams et al. (hereafter

Adams)(US Pat. 5,471,411) and further in view of Konishi et al. (hereafter Konishi)(US

Pat. 4,727,505).

4.   Adams and Konishi were cited in the previous action dated 07/09/2008.

5.   **As to claim 1,** Ooyabu discloses a method comprising:

Storing a plurality of sets of filter coefficients in a memory, wherein each set of

filter coefficients defines a different filter function (column 2, lines 3-31 and lines 62-68);

Selecting a first one of the sets of filter coefficients (column 2, lines 3-31 and

lines 62-68).

6.   Ooyabu does not disclose interpolating the first selected set of filter coefficients.

However, Adams discloses interpolating the first selected set of filter coefficients

(abstract and column 4, lines 54-57).

7.   Therefore, it would have been obvious to one of ordinary skill in the art at the

time of the invention to modify the teachings of Ooyabu, by performing interpolation, as

taught by Adams, for the benefit of varying the output samples of the processed signal.

8.   The combination of Ooyabu and Adams do not disclose convolving the

interpolated first selected filter coefficients with an input signal to produce a filtered

output signal.

However, Konishi discloses convolving the interpolated first selected filter

coefficients with an input signal to produce a filtered output signal (Column 7, lines 27-

37 disclose in a digital processor the convolution of an input signal with appropriate

coefficient data.).

9.   Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Oyyabu and Adams, by performing the convolution operation, as taught by Konishi, in order to process signals containing a large number of high-frequency components, as well as providing a convolution arithmetic circuit suitable for real-time processing of digital signals.

10.   **As to claims 2, 12, and 23**, the combination of Ooyabu, Adams, and Konishi do not disclose the input signal comprises an audio signal, wherein the input signal is convolved with the interpolated filter coefficients in a sample rate converter of a digital pulse width modulation (PWM) audio amplifier. Examiner is taking official notice that using an audio signal as input, convolving in a sample rate converter of a digital audio amplifier, and implementing in a PWM amplifier was well known in the art at the time the invention was made.

11.   Therefore, it would have been obvious to one of ordinary skill in the art the time of the invention to modify the teachings of Ooyabu, Adams, and Konishi, by using the well known knowledge of an audio signal as input, convolving in a sample rate converter of a digital audio amplifier, and implementing in a PWM amplifier for the benefit of converting from one sample rate into another sample rate and completing filter operations. Motivation to implement this well known knowledge can be found in that audio or image signals are well known in the art to be used for filtering into an output

signal and that PWM amplifiers are often used in telecommunications and audio signals as a method of reducing the total amount of power delivered.

12.   **As to claim 7 and 19,** the combination of Ooyabu, Adams, and Konishi disclose the plurality of sets of filter coefficients are stored in a single memory (Ooyabu, ROM 18 of figure 1).

13.   **As to claims 10 and 11,** the claims are rejected for the same reasons as claim 1 above.

14.   **As to claim 22,** the claim is rejected for the same reasons as claim 1 above.

15.   **As to claims 24-26,** the combination of Ooyabu, Adams, and Konishi, disclose the memory is configured to store the multiple sets of filter coefficients prior to receiving an input signal (Ooyabu, column 2, lines 62-68 and column 3, lines 24-68), and wherein the filter function defined by each set of filter coefficients corrects distortion in an output signal produced by convolving the input signal with the interpolated coefficients based on the corresponding set of filter coefficients (Adams, column 2, lines 1-10; and Konishi, column 7, lines 27-37).

16.   Claims 5, 6, 15, and 16 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Ooyabu in view of Adams and Konishi and further in view Thompson

(US Pat. 5,928,313).

17.   Thompson was cited in the previous action dated 07/09/2008.

18.   **As to claims 5 and 15,** the combination of Ooyabu, Adams, and Konishi do not

disclose selecting the first one of the sets of filter coefficients comprises reading a value

stored in a filter selection register and selecting the first one of the sets of filter

coefficients based upon the value.

However, Thompson discloses selecting the first one of the sets of filter

coefficients comprises reading a value stored in a filter selection register and selecting

the first one of the sets of filter coefficients based upon the value (column 7, line 56-

column 8, line 7).

19.   Therefore, it would have been obvious to one of ordinary skill in the art at the

time of the invention to modify the teachings of Ooyabu, Adams, and Konishi, by

reading a value stored in a filter selection register and selecting the first one of the sets

of filter coefficients based upon the value, as taught by Thompson, for the benefit of

utilizing the hardware fast enough to process incoming samples in real time.

20.   **As to claim 6,** the combination of Ooyabu, Adams, Konishi, and Thompson

disclose changing the value in the filter selection register to a new value and selecting a

new one of the sets of filter coefficients based upon the new value (Thompson, column

8, lines 7-19).

21.   **As to claim 16,** the combination of Ooyabu, Adams, Konishi, and Thompson

disclose the filter selection register is configured to allow modification of the filter

selection value (Thompson, column 8, lines 7-19).

22.   Claims 8, 9, 20, and 21 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Ooyabu in view of Adams and Konishi and further in view of Auld et

al. (hereafter Auld)(US Pat. 6,411,333).

23.   Auld was cited in the previous office action dated 07/09/2008.

24.   **As to claims 8, 9, 20, and 21,** the combination of Ooyabu, Adams, and Konishi

do not disclose the first selected set of filter coefficients are interpolated according to a

cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise

polyphase filter coefficients.

However, Auld discloses first selected set of filter coefficients are interpolated according to a cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise polyphase filter coefficients (column 11, lines 46-50).

25.   Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Ooyabu, Adams, and Konishi by having the first selected set of filter coefficients be interpolated according to a cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise polyphase filter coefficients, as taught by Auld, for the benefit of effectively interpolating multi-dimensional data.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL YAARY whose telephone number is (571)270-1249. The examiner can normally be reached on Monday-Friday, 8:00 a.m - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis Bullock can be reached on (571) 272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. Y./
Examiner, Art Unit 2193

/Lewis A. Bullock, Jr./
Supervisory Patent Examiner, Art Unit 2193